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XLIV.—*On the HEXACTINELLIDÆ and LITHISTIDÆ generally, and particularly on the Aphrocallistidæ, Aulodictyon, and Farreæ, together with Facts elicited from their Deciduous Structures, and Descriptions respectively of Three New Species.* By H. J. CARTER, F.R.S. &c.

[Plates XIII.—XVII.]

THIS paper was commenced with observations on some deciduous specimens of the Hexactinellidæ from the deep sea, in which the influence of an absorbing process (to be mentioned hereafter) had rendered the sexradiate spicules, on which the vitreous fibre had originally been deposited, again recognizable. It was then found necessary to study the Hexactinellidæ and Lithistidæ (that is, Dr. J. E. Gray's *Coralliospongia ex parte*) generally for a better understanding of this process, and particularly the *Aphrocallistidæ*, *Aulodictyon*, and the *Farreæ*, as it was in the deciduous fibre of such sponges that the facts desired were, if possible, to be ascertained. During this study much information hitherto unknown has been obtained, and three new species of vitreous sponges discovered.

I shall first, therefore, give the results of my investigations of Dr. Gray's *Coralliospongia* &c., under the heads respectively of "Hexactinellidæ" and "Lithistidæ"—afterwards an account of the specimens respectively to which I shall have to refer when the spicules of the *Aphrocallistidæ*, *Aulodictyon*, and the *Farreæ* in the *living state* have been described and I come to the identifying of them in the *deciduous structures*—and, lastly, a short summary of what these structures have